

We claim:

1. A method for modulating a binary bit stream in a composite video signal, the composite video signal includes luminance, chrominance and audio components, the method comprising:

5 obtaining sync pulse information from the composite video signal;  
modulating the binary bit stream according to a modified OFDM technique, the modulating comprising:

10 generating in-phase and quadrature symbol frames from the binary bit stream; and

15 combining the in-phase and quadrature symbol frames streams according to OFDM modulation techniques;

converting the combined symbol frames into an analog signal; and

combining the analog signal with the composite video signal according to the obtained sync pulse information.

15 2. The method of Claim 1, wherein combining comprises:

translating the analog signal to be centered at an intermediate frequency above the baseband of the composite video signal; and

amplifying the translated analog signal.

20 3. The method of Claim 2, wherein the intermediate frequency is at least 2 MHz.

4. The method of Claim 2, wherein the intermediate frequency is less than 3 MHz.

25 5. The method of Claim 1, wherein modulating further comprises:

encoding the binary bit stream with forward error correction code; and

precoding the generated in-phase and quadrature symbol streams according to comb filtering effects.

30 6. The method of Claim 5, wherein precoding comprises:

the assembly of in-phase and quadrature symbol frames according to OFDM modulation techniques.

7. The method of Claim 1, wherein the composite video signal is a NTSC video signal.

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8. An apparatus for modulating a binary bit stream in a composite video signal, the composite video signal includes luminance, chrominance and audio components, the apparatus comprising:

a sync pulse stripper configured to obtain sync pulse information from the composite video signal;

10 a modulator configured to modulate the binary bit stream according to quadrature amplitude modulation, the modulator comprising:

15 a symbol mapper configured to generate in-phase and quadrature symbol streams; and  
a symbol stream combiner configured to combine the in-phase and quadrature symbol

streams according to quadrature amplitude modulation techniques;

a digital to analog converter configured to convert the combined symbol streams into an analog signal; and

20 a combiner configured to combine the analog signal with the composite video signal according to the obtained sync pulse information.

25 9. The apparatus of Claim 8, wherein the combiner comprises:

a translator configured to translate the analog signal to be centered at an intermediate frequency above the baseband of the composite video signal; and

an amplifier configured to amplifying the translated analog signal.

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10. The apparatus of Claim 9, wherein the intermediate frequency is at least 2 MHz.

11. The apparatus of Claim 9, wherein the intermediate frequency is less than 3 MHz.

30 12. The apparatus of Claim 8, wherein modulator further comprises:

a precoder configured to precode the generated in-phase and quadrature symbol streams according to comb filtering effects.

13. The apparatus of Claim 12, wherein the precoder comprises:

5 a filter configured to filter the generated in-phase and quadrature symbol streams according to Nyquist square root filtering techniques.

14. The apparatus of Claim 8, wherein the composite video signal is a NTSC video signal.

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15. A method for demodulating a binary bit stream modulated in a composite video signal as a gated and windowed OFDM offset carrier modulated signal, the composite video signal includes luminance, chrominance and audio components, the method comprising:  
converting the composite video signal modulated with the carrier centered OFDM modulated signal into a digital signal;

splitting the digital signal into synch pulses and a quadrature amplitude modulated data stream;

separating the offset OFDM modulated data stream into in-phase and quadrature symbol frames streams according to the synch pulses; and

20 combining the in-phase and quadrature demodulated symbol frames into a single binary data stream.

16. The method of Claim 15, wherein splitting comprises:

suppressing the composite video signal for attaining the offset OFDM modulated data stream;

suppressing the offset OFDM modulated data stream for attaining the composite video signal; and

extracting the synch pulses from the attained composite video signal.

30 17. The method of Claim 15, wherein separating comprises:

frequency translating the offset OFDM modulated data frames to the baseband of the composite video signal.

18. The method of Claim 15, further comprising:

5 decoding the single binary data stream according to forward error correction coding included in the binary data stream.

19. The method of Claim 15, wherein the composite video signal is a NTSC video signal.

10 20. A receiver for demodulating a binary bit stream modulated in a composite video signal as an offset OFDM modulated signal, the composite video signal includes luminance, chrominance and audio components, the receiver comprising:

an analog to digital converter configured to convert the composite video signal modulated with the offset OFDM modulated signal into a digital signal;

15 a splitter configured to split the digital signal into synch pulses and an I-Q OFDM modulated data stream;

a separator configured to separate the offset OFDM modulated data frame into in-phase and quadrature symbol frames according to the synch pulses; and

20 a combiner configured to combine the in-phase and quadrature data frames into a single binary data stream.

21. The receiver of Claim 20, wherein the splitter comprises:

25 a first signal suppressor configured to suppress the composite video signal for attaining the I-Q OFDM modulated data stream;

a second signal suppressor configured to suppress the I-Q OFDM modulated data stream for attaining the composite video signal; and

an extractor configured to extract the synch pulses from the attained composite video signal.

30 22. The receiver of Claim 20, wherein the separator comprises:

a translator configured to frequency translate the I-Q OFDM modulated data frame to the baseband of the composite video signal.

23. The receiver of Claim 20, further comprising:

- 5 a decoder configured to decode the single binary data stream according to forward error correction coding included in the binary data stream.

24. The receiver of Claim 20, wherein the composite video signal is a NTSC video signal.

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